

This Page Is Inserted by IFW Operations  
and is not a part of the Official Record

## **BEST AVAILABLE IMAGES**

Defective images within this document are accurate representations of the original documents submitted by the applicant.

Defects in the images may include (but are not limited to):

- BLACK BORDERS
- TEXT CUT OFF AT TOP, BOTTOM OR SIDES
- FADED TEXT
- ILLEGIBLE TEXT
- SKEWED/SLANTED IMAGES
- COLORED PHOTOS
- BLACK OR VERY BLACK AND WHITE DARK PHOTOS
- GRAY SCALE DOCUMENTS

**IMAGES ARE BEST AVAILABLE COPY.**

**As rescanning documents *will not* correct images,  
please do not report the images to the  
Image Problem Mailbox.**

(19)



Europäisches Patentamt  
European Patent Office  
Office européen des brevets



(11)

**EP 0 875 211 B1**

(12)

## EUROPEAN PATENT SPECIFICATION

(45) Date of publication and mention  
of the grant of the patent:  
01.10.2003 Bulletin 2003/40

(51) Int Cl.7: **A61C 3/00, A61C 7/12**

(21) Application number: **98202610.6**

(22) Date of filing: **20.05.1992**

### (54) Improved edgewise orthodontic bracket

Verbesserte, hochkantige orthodontische Klammer

Bague d'orthodontie améliorée

(84) Designated Contracting States:  
**DE ES FR IT**

(30) Priority: **20.05.1991 US 702943**

(43) Date of publication of application:  
**04.11.1998 Bulletin 1998/45**

(62) Document number(s) of the earlier application(s) in  
accordance with Art. 76 EPC:  
**92914262.8 / 0 588 961**

(73) Proprietor: **RMO, INC.**  
**Denver, Colorado 80204 (US)**

(72) Inventors:

- **Peterson, Jeffrey A**  
**Aurora, CO 80013 (US)**
- **Franseen, Steven A.**  
**Denver, CO 80235 (US)**

(74) Representative: **Goddard, Frances Anna**  
**D Young & Co**  
**21 New Fetter Lane**  
**London EC4A 1DA (GB)**

(56) References cited:

<b>EP-A- 0 317 098</b>	<b>EP-A- 0 397 533</b>
<b>DE-U- 8 903 611</b>	<b>US-A- 4 529 382</b>

**EP 0 875 211 B1**

Note: Within nine months from the publication of the mention of the grant of the European patent, any person may give notice to the European Patent Office of opposition to the European patent granted. Notice of opposition shall be filed in a written reasoned statement. It shall not be deemed to have been filed until the opposition fee has been paid. (Art. 99(1) European Patent Convention).

## Description

### FIELD OF THE INVENTION

[0001] This invention generally relates to edgewise orthodontic brackets and, more particularly, to edgewise brackets having enhanced treatment, comfort and ease-of-use features, as well as increased modalities.

[0002] An orthodontic bracket as defined in the preamble of claim 1 is disclosed in DE-U-8 903 611.

### BACKGROUND OF THE INVENTION

[0003] Orthodontic brackets are widely used to align teeth through the application of forces selectively provided by interconnected archwires and accessories. Brackets are typically of metal, ceramic or composite construction and are interconnected to either bands or bonding pads for attachment to teeth.

[0004] In edgewise brackets, an archwire passes through a labially opening, horizontal slot defined by one or more pair of opposing tie wings. The archwire is pre-shaped and sized to provide the desired forces. In each bracket, a tie wing pair includes a gingivally extending tie wing and occlusally extending tie wing. Once placed in the slot of one or more pair of tie wings, an archwire is typically restricted therein by a ligating device such as a steel or elastomeric ligature.

[0005] As orthodontic treatment objectives and techniques continue to evolve, numerous corresponding edgewise bracket designs and interconnecting accessories have been proposed. Recently, it has been recognized that it is desirable to reduce frictional engagement between the archwire and bracket surfaces defining the archwire slot to facilitate space closure and bodily tooth movement. Similarly, in many situations, it is now a goal to reduce frictional engagement between the archwire and ligating device employed to restrict the archwire within the slot. Such friction reduction can markedly increase the rate of tooth movement and reduce the duration of the orthodontic treatment.

[0006] At the same time, patient comfort and ease-of-use considerations have become increasingly important. Patient comfort has been largely addressed by reducing bracket size to yield smaller and more smoothly contoured bracket. Ease-of-use considerations have stimulated bracket designs which facilitate practitioner's bracket placement/use and accommodate plural modalities.

[0007] The present invention represents significant advances in relation to the above-noted orthodontic bracket considerations, both singularly and combinatively, while maintaining the structural integrity of the bracket.

### SUMMARY OF THE INVENTION

[0008] In one aspect of the present invention, an

edgewise bracket is provided having a pair of tie wings defining an archwire slot therebetween, and a pair of ligating support means, one defined within the mesial/distal extent of each tie wing. The ligating support means may be selectively employed to reduce frictional engagement between an archwire positioned in the slot and a ligating device positioned on the ligating support means and across the archwire slot. Each ligating support means includes a sloped, or angled, portion that extends labially toward the slot (e.g., labially from the gingival/occlusal periphery towards the slot), to reduce binding of a ligating device positioned thereupon. The ligating support means are notches extending from the gingival or occlusal periphery of a tie wing, sized to readily receive a ligating device, and preferably having a curvilinear, concave configuration to further reduce binding. Typically, the opposing notches in a given pair of tie wings will have a common center axis which is parallel to the gingival-occlusal center axis of the bracket. When the archwire slot includes convex sidewall and/or floor portions to reduce archwire/bracket frictional engagement, the ligating support means are preferably disposed adjacent thereto (e.g., centered upon a common gingival-occlusal plane) for enhanced treatment control.

[0009] In another aspect of the present invention, an edgewise bracket is provided having a single pair of tie wings and two pairs of opposing ligating support means defined within the mesial/distal extent of the tie wings, one pair on each of the mesial and distal sides of the bracket. The gingival/occlusal extremes of the tie wings define an elliptical configuration when viewed labially. More particularly, each tie wing comprises central, mesial and distal portions which extend gingivally or occlusally, with ligating support means defined between the central and mesial portions and between the central and distal portions, wherein the gingival/occlusal edges of such portions define an elliptical configuration. Such configuration accommodates size reduction, yielding patient comfort benefits, while preserving structural integrity and performance.

[0010] In this regard, and as will become apparent, a single pair of opposing T-shaped tie wings is preferred. That is, the "caps" of the T-shaped tie wings define an archwire slot therebetween, and the "center legs" of each tie wing extends gingivally or occlusally. The ligating support means are notches defined on the gingival/occlusal periphery on both the mesial and distal sides of a center leg of each T-shaped tie wing. The center legs each comprise a gingivally/occlusally extending cantilevered portion that can be conveniently employed as a stanchion for ligature interconnection. The mesial/distal tie wing tip portions on the outside of each notch also comprise gingivally/occlusally extending cantilevered portions that extend a sufficient distance outward from the outer tie wing sidewalls to retain a ligating device in an arcuate seat formed wider the cantilevered tie wing tip portions and center legs during conventional ligation. Relatedly, the cantilevered center leg of each T-

shaped tie wing should extend at least approximately the same distance outward beyond the outer gingival/occlusal extremes of the adjacent ligating support means so as to retain a ligating device when the ligating support notches are selectively employed by a practitioner to support a ligating device.

[0011] In a further aspect of the present invention, an edgewise bracket is provided having a single pair of tie wings defining an archwire slot therebetween, and an integral T-shaped hook extending gingivally/occlusally from one tie wing, and in perpendicular relation to the longitudinal center axis of the archwire slot, wherein traction devices (e.g., rubber bands, springs, etc.) can be readily attached from a plurality of directions so as to accommodate plural modalities for treatment. The T-shaped hook is centered upon the gingival-occlusal center axis of the bracket, and is preferably provided as a cantilevered extension of the center leg of a T-shaped tie wing so as to communicate external face moments created by interconnected traction devices close to a tooth's root center of resistance. Preferably, the T-shaped hook is generally flat as viewed from the mesial and distal aspects. Further, as viewed from the labial aspect, the T-shaped hook preferably comprises a tapered portion contiguous to the center leg of the T-shaped tie wing, an arcuate neck portion contiguous thereto, and a head portion contiguous thereto the tapered portion, wherein a traction device may be reliably maintained in the neck portion. That is, the tapered portion serves to restrict movement of the traction device towards the archwire slot of the bracket, and the head portion serves to restrict disconnection of the traction device from the T-shaped hook. The integral T-shaped hook preferably comprises a malleable material so as to allow for selective pivotal movement of the T-shaped hook as may be desirable for soft tissue clearance and patient comfort.

[0012] In yet another aspect of the present invention, an edgewise bracket is provided having at least one pair of tie wings defining an archwire slot therebetween, wherein when viewed from mesial/distal aspects, the gingivally/occlusally facing outer sidewalls of the tie wing pair define a trapezoid. One outer sidewall is disposed at an angle relative to the longitudinal center plane of the archwire slot, wherein the sidewall extends labially away from such center plane. The other sidewall is disposed substantially parallel to the archwire slot center plane. The angled sidewall is disposed gingivally in maxillary applications and occlusally in mandibular applications. By way of example, use of the described configuration allows for enhanced, early treatment of partially erupted upper bicuspids, wherein the archwire slot will be acceptably, gingivally positioned upon full eruption of the bicuspid. This enhances treatment and reduces demands upon the practitioner time. Further, bracket systems of this design will generally reduce bracket/tooth contact between the upper and lower arches. Bracket profile and strength can also be accept-

ably maintained using the described configuration.

[0013] In another aspect of the present invention, an edgewise bracket is provided having one tie wing pair defining an archwire slot therebetween and at least one auxiliary slot extending from a gingival edge to the occlusal edge, or vice versa, wherein the slot and shaft of the auxiliary device to be inserted into the slot have complementary configurations to restrict rotational movement therebetween. By way of example, the auxiliary slot may have adjoining flat inner sidewalls (e.g., defining square corners), and the auxiliary shaft may have complementary flat outer sidewalls (e.g., defining square corners), wherein rotational movement therebetween is desirably restricted.

[0014] In a related aspect of the present invention, an edgewise bracket is provided having a single tie wing pair defining an archwire slot therebetween, at least one convex portion extending labially and transversely across the floor of the archwire slot, and at least one auxiliary slot extending gingivally/occlusally and positioned under the convex slot floor portion. By positioning the auxiliary slot under the convex slot floor portion, bracket height can be advantageously conserved, and therefore reduced, so as to enhance patient comfort.

When two convex slot floor portions are provided, one on each of the mesial/distal sides, twin auxiliary slots may be advantageously positioned so that one passes under each of the convex slot floor portions. In addition to the above-noted advantages, this bracket yields significant tooth rotation capabilities. For example, in early treatment stages, the twin auxiliary slots can be utilized with a steel ligature to achieve rapid gross tooth rotation. As can be appreciated, complementary auxiliary slot/auxiliary shaft configurations of the above-described nature can also be employed.

[0015] In one embodiment of the a present invention, an edgewise bracket is provided having a single set of opposing T-shaped tie wings with ligating support notches defined on each side (i.e., mesially and distally) of the center leg of each tie wing. The sidewalls defining the archwire slot are provided to present two sets of opposing convex sidewall portions, one set on each of the mesial and distal sides of the bracket. Similarly, the floor of the archwire slot is provided to present two convex portions extending labially and transversely across the slot, one on each of the mesial and distal sides of the bracket. By virtue of this arrangement, the bracket yields desirable tooth rotation and alignment capabilities with reduced archwire/archwire slot frictional engagement and selectively reduced archwire/ligating device frictional engagement. Further, this configuration defines a dynamic archwire slot, wherein the archwire is allowed to maintain a "memory" of its slot entry angle, as is now desirable. The notches each comprise a portion that extends labially outwardly from the gingival/occlusal periphery towards the archwire slot and presents concave, curvilinear surfaces to reduce ligature binding. The gingival/occlusal edges of the center legs and wing tip por-

tions of the opposing T-shaped tie wings define an elliptical configuration when viewed labially so as to reduce bracket size and advance patient comfort/appearance. All prominent edges exposed to soft tissue are preferably rounded for patient comfort.

[0016] An integral T-shaped hook of the above-described nature may be optionally provided as a cantilevered gingival/occlusal extension of the center leg of either T-shaped tie wing. The T-shaped hook preferably comprises a malleable material and preferably comprises flat lingually and labially facing surfaces, wherein the hook can be manually pivoted to a limited extent by a practitioner relative to the center leg of the tie wing.

[0017] An auxiliary slot may also be optionally provided and disposed within the gingival-occlusal center plane of the bracket, underlying the center leg portions of the opposing T-shaped tie wings. Alternatively, twin auxiliary slots may be provided, one on each side of the gingival-occlusal center plane of the bracket (i.e., mesially and distally positioned), such slots passing under the mesial and the distal convex slot floor portions of the archwire slot. Whether a single or twin auxiliary slot arrangement is provided, each slot preferably has an inner-configuration which will restrict rotation of complementary auxiliaries inserted thereto, as described above.

[0018] The T-shaped tie wings of the bracket may also be optionally defined so that the outer gingival/occlusal facing sidewalls of the tie wing pair define a trapezoid when viewed from the mesial or distal aspects. More particularly, one of the outer sidewalls is disposed at an angle relative to the longitudinal center plane of the archwire slot, and is perpendicular to the tie wing base surface or base/bottom surface of the bracket. The other outer sidewall is disposed in parallel relation to the center plane of the archwire slot.

[0019] The center leg of each T-shaped tie wing may also be optionally disposed at an acute angle relative to the longitudinal center axis of the slot. Such angling may be desired in applications wherein the central axis of the clinical crown is positioned at an acute angle relative to the occlusal plane in normal occlusion. Such angling correspondingly facilitates the practitioner's placement of the bracket on a tooth, wherein the axes of the center legs may be disposed along a tooth long axis, and wherein the center axis of the bracket slot may be disposed parallel to the occlusal plane. Preferably, the mesial/distal facing edges of the center leg of each T-shaped tie wing are also parallel to the axes of the center legs to further facilitate accurate placement on a tooth. It is also preferable for the center axes of opposing ligating support notches to be disposed parallel to the gingival-occlusal center plane of the bracket. Relatedly, for rotational purposes, it is preferable for the apices of the opposing convex slot sidewall portions and a convex slot floor portion correspondingly positioned on the same mesial or distal side to lie within a common plane that is disposed substantially perpendicular to the lon-

gitudinal center plane of the archwire slot.

[0020] As will be appreciated by those skilled in the art, the embodiment of the invention described herein yields numerous advantageous features, yielding a new state-of-the-art bracket.

## BRIEF DESCRIPTION OF THE DRAWINGS

[0021]

Figs. 1A-C illustrate labial, side and end views of one embodiment of the present invention;

Figs. 2A and 2B, and Figs. 2C and 2D, illustrate labial and end views of the embodiment of Figs. 1A-C when ligating support means are employed to support an elastomeric ligature and when ligating support means are not employed to support an elastomeric ligature, respectively;

Figs. 3A-C illustrate labial, side and end views of a modified version of said embodiment of the present invention having an integral T-shaped hook and twin auxiliary slots;

Figs. 4A-C illustrate labial, side and end views of a modified version of said embodiment of the present invention having outer tie wing sidewalls that define a trapezoid therebetween;

Figs. 5A-D illustrate labial, side and end views of the modified embodiment of the present invention illustrated in Figs. 4A-C, with a central auxiliary slot; Figs. 6A-C illustrate labial, side and opposing end views of the modified embodiment of the present invention illustrated in Figs. 4A-C, with an angulated gingival-occlusal center axis and twin auxiliary slots; and,

Figs. 7A-B illustrate two views of an exemplary auxiliary device useable with the auxiliary slots of the present invention.

## DETAILED DESCRIPTION

[0022] One embodiment of the edgewise bracket 10 of the present invention is illustrated in Figs. 1A-C and 2A-D, with various modifications, modalities and an exemplary auxiliary reflected by Figs. 3A-C, 4A-C, 5A-C, 6A-C and 7A-B. Corresponding features are referenced by common reference numerals.

[0023] The edgewise bracket 10 comprises two integral, opposing T-shaped tie wings 12 and 14 having a common base portion and base surface 16, and defining an archwire slot 18 therebetween. By way of example only, a flange 32 may be adjoined to the bracket 10 for subsequent attachment to a hand. Alternatively, the bracket may be adjoined to a bonding pad (not shown).

[0024] Two sets of opposing ligating support means 20 and 22, are provided, each set comprising a gingivally disposed notch and occlusally disposed notch on the gingival and occlusal edges of tie wings 12, 14, respectively. Each ligating support means has a sloped

portion 24 and top land portion 26. The sloped portions 24 have concave, curvilinear surfaces.

[0025] Each of the T-shaped tie wings 12, 14 comprises a cantilevered central leg portion 28 centered upon the gingival-occlusal center axis (lying within plane AA) of the bracket 10 and cantilevered mesial/distal wing tip portions 30, with the above-noted top land portions 26 integral therebetween. The gingival/occlusal extremes of the center leg 28 and mesial/distal wing tip portions 30 of the tie wings 12, 14 define, from the labial aspect, an elliptical configuration E. In this regard, cantilevered wing tip portions 30 extend a sufficient distance d outward from the outer sidewalls 34, 36 of the tie wings 12, 14, respectively, to retain a ligating device in an arcuate seat 38 formed under the cantilevered tie wing tip portions 30 and center legs 28. Relatedly, the cantilevered center leg 28 of each T-shaped tie wing 12, 14, extends a distance f beyond the outer gingival/occlusal extreme of the ligating support means 20 adjacent thereto, such distance f being at least approximately as great as the distance d.

[0026] The sidewalls defining the archwire slot 18 comprise two sets of opposing convex portions 42 to reduce frictional engagement with an archwire. Similarly, the floor of archwire slot 18 is provided with two convex portions 44 extending transversely across the archwire slot 18 to reduce frictional engagement with an archwire. As illustrated in Figs. 1A-C, the ligating support means 20, convex slot sidewall portions 42, and convex slot floor portion 44 disposed on the same side of the gingival-occlusal center plane AA may have a common center axis (lying within plane BB). As such, frictional engagement between an archwire and the slot walls and base, and between an archwire and ligating device supported on ligating support means 20 occurs in a limited region about plane BB.

[0027] An optional auxiliary slot 70 may be provided to receive a complimentary auxiliary device, such as the exemplary auxiliary 74 illustrated in Figs. 7A and 7B. The inner sidewalls of auxiliary slot 70 and interfacing shaft portion 76 of the exemplary auxiliary 74 are preferably configured to restrict rotational movement therebetween. As illustrated, a complimentary square-angled configuration may be employed. Additionally, the auxiliary 74 preferably comprises an extending portion 78 having an outer configuration which will not fit into auxiliary slot 70, thereby facilitating placement and removal.

[0028] Figs. 2A-B illustrate the interface between an archwire X and elastomeric ligating device Y when both sets of the ligating support means 20 of the embodiment of the present invention illustrated in Figs. 1A-C are utilized. Figs. 2C-D illustrate the interface between an archwire X and elastomeric ligating device Y when neither of the ligating support means 20 of such embodiment are utilized. As will be appreciated by those in the art, there are different treatment situations where each of these modalities may be desired. Additionally, the provision of a set of ligating support means 20 on each

of the mesial and distal sides of the bracket 10 allows a practitioner to utilize one set but-not the other, as may be desirable.

[0029] In Figs. 3A-C an integral T-shaped hook 50 is provided as an extension to the center leg 28 of one of the T-shaped tie wings 12. The T-shaped hook 50 preferably comprises flat lingual and labial surfaces (see Fig. 3C), and is preferably malleable to allow far pivotal movement relative to center leg 20. The T-shaped hook 50 preferably comprises a tapered portion 52, arcuate neck portion 54 and head portion 56, whereby retention of a traction device in neck portion 54 is enhanced.

[0030] Twin auxiliary slots 80 may be optionally provided for receipt of an auxiliary device, such as the exemplary auxiliary 74 shown in Figs. 7A-B. The twin auxiliary slots 80 are beneficially disposed under the convex slot floor portions 44. The configuration of slots 80 and exemplary auxiliary 74 may be as described above to restrict rotational movement therebetween and facilitate placement/removal.

[0031] Figs. 3A-C also illustrate optional saddles 60 which can be provided in the support landing portions 26 for receiving a ligating device. It is believed that such saddles 60 may be beneficial in certain early treatment situations for purposes of retaining an undersized archwire in the desired position for rotational purposes.

[0032] In Figs. 4A-D, the outer sidewall 34 of tie wing 12 and outer sidewall 36 of tie wing 14 define a trapezoid therebetween. Specifically outer side wall 34 is angled relative to the longitudinal center plane CC of the archwire slot 18, and the outer tie wing sidewall 36 is disposed in parallel relation to the center plane CC of the archwire slot 18. By virtue of this arrangement, the outer sidewall 34 may be, for example, advantageously disposed gingivally on partially erupted upper bicuspids. Further, bracket systems employed by this configuration will generally reduce bracket/tooth contact between upper and lower arches.

[0033] The modified embodiment illustrated in Figs. 4A-C is shown with additional features in Figs. 5A-C and 6A-C. In Figs. 5A-C, a central auxiliary slot 70 is provided. Figs. 6A-C illustrate the inclusion of twin auxiliary slots 80 for receiving of auxiliary devices. The twin vertical slots 80 are disposed so that each passes under one of the convex slot floor portions 44.

[0034] In the version shown in Figs. 6A-C, it should also be appreciated that the gingival-occlusal center axis of the bracket (lying within plane AA) can be disposed at an acute angle relative to center axis of archwire slot 18 (lying within plane CC). More particularly, center legs 28 may be centered upon the gingival-occlusal center axis and may be provided with distal/mesial surfaces 84 which are parallel to the gingival-occlusal center axis thereby facilitating placement of the bracket. In this modified version, it should be recognized that while the center plane BB of the ligating support means 20 is also disposed parallel to the gingival-occlusal center axis, the apices of the convex slot sidewall portions 42 and

convex slot floor portion on each of mesial and distal sides lie in a plane which is perpendicular to the archwire slot center plane CC. Relatedly, it should be appreciated that, when a T-shaped hook is utilised (such as the T-shaped hook 50 illustrated in Figs. 3A-C above), the center axis thereof will be disposed perpendicularly to the center axis of the archwire slot 18 and at an angle relative to the gingival-occlusal center axis of the bracket 10.

[0035] The foregoing description of the present invention has been provided for purposes of illustration and description. This description is not intended to limit the invention and various modalities thereof. Variations, embodiments and modifications will be apparent to those skilled in the art and are intended to be within the scope of the following claims.

### Claims

1. An edgewise orthodontic bracket (10) comprising:

gingival and occlusal tie wings (12, 14) defining a labially opening archwire slot (18) therebetween, each of the gingival and occlusal tie wings (12, 14) having a mesial/distal extent; said bracket (10) also comprises a first set of gingival and occlusal notches (20), the gingival notch being disposed within the mesial/distal extent of said gingival tie wing (12) and the occlusal notch being disposed within the mesial/distal extent of said occlusal tie wing (14); **characterised by**

a first set of opposing convex sidewall portions (42) within said archwire slot (18), wherein said first set of convex sidewall portions (42) is positioned substantially between said gingival and occlusal notches of said first set of notches (20).

2. An edgewise orthodontic bracket according to Claim 1, further comprising:

a second set of gingival and occlusal notches (22), the gingival notch being disposed within the mesial/distal extent of said gingival tie wing (12) and the occlusal notch being disposed within the mesial/distal extent of said occlusal tie wing (14);  
said first set of gingival and occlusal notches (20) being disposed on a mesial side of said bracket (10), and said second set of gingival and occlusal notches (22) being disposed on a distal side of said bracket (10);  
a second set of opposing convex sidewall portions (42) within said archwire slot (18), wherein said second set of convex sidewall portions (42) is positioned substantially between said

gingival and occlusal notches of said second set of notches (22).

3. An edgewise orthodontic bracket according to Claim 1 or 2, wherein said gingival notch includes a sloped portion extending labially toward the archwire slot, and said occlusal notch includes a sloped portion extending labially towards the archwire slot.

4. An edgewise orthodontic bracket according to any preceding claim, wherein said gingival notch further comprises a concave notch extending from a gingival edge of said gingival tie wing towards said archwire slot, and wherein said occlusal notch further comprises a concave notch extending from an occlusal edge of said occlusal tie wing toward said archwire slot.

5. An edgewise orthodontic bracket according to any preceding claim, wherein:

said gingival tie wing (12) further comprises a gingivally-extending center leg portion (28) and gingivally-extending mesial and distal tie wing tip portions (30);  
said occlusal tie wing (14) further comprises an occlusally-extending center leg portion (28) and occlusally-extending mesial and distal tie wing tip portions (30); and

wherein said gingivally-extending center leg (28) extends a greater distance (F) from said archwire slot (18) than each of said gingivally-extending mesial and distal tie wing tip portions (30), and said occlusally-extending center leg (28) extends a greater distance (F) from said archwire slot (18) than each of said occlusally-extending mesial and distal tie wing tip portions (30).

6. An edgewise orthodontic bracket according to Claim 2 or to any of Claims 3 to 5 when dependent from Claim 2, comprising:

a first convex floor portion (44) within said archwire slot (18), positioned substantially between said first set of gingival and occlusal notches (20); and  
a second convex floor portion (44) within said archwire slot (18), positioned substantially between said second set of gingival and occlusal notches (22).

7. An edgewise orthodontic bracket according to any preceding claim, wherein gingival edges of said gingival tie wing and occlusal edges of said occlusal tie wing define an elliptical configuration.

# Patentansprüche

1. Seitliche kieferorthopädische Klammer (10), die aufweist:

gingivale und okklusale Verankerungsflügel (12, 14), die einen sich labial öffnenden Schlitz (18) für einen Drahtbogen zwischen sich definieren, wobei jeder der gingivalen und okklusalen Verankerungsflügel (12, 14) eine mesiale/distale Ausdehnung hat;

wobei die Klammer (10) auch einen ersten Satz von gingivalen und okklusalen Aussparungen bzw. Einkerbungen (20) aufweist, wobei die gingivale Aussparung innerhalb der mesialen/distalen Ausdehnung des gingivalen Verankerungsflügels (12) angeordnet ist und die okklusale Aussparung innerhalb der mesialen/distalen Ausdehnung des okklusalen Verankerungsflügels (14) angeordnet ist, **dadurch gekennzeichnet, daß** ein erster Satz von gegenüberliegenden konvexen Seitenwandteilen (42) innerhalb des Schlitzes (18) für den Drahtbogen angeordnet ist, wobei der erste Satz von konvexen Seitenwandteilen (42) im wesentlichen zwischen den gingivalen und okklusalen Aussparungen des ersten Satzes von Aussparungen (20) angeordnet ist.

2. Seitliche kieferorthopädische Klammer nach Anspruch 1, **dadurch gekennzeichnet, daß** sie darüber hinaus aufweist:

einen zweiten Satz von gingivalen und okklusalen Aussparungen (22), wobei die gingivale Aussparung innerhalb der mesialen/distalen Ausdehnung des gingivalen Verankerungsflügels (12) angeordnet ist und die okklusale Aussparung innerhalb der mesialen/distalen Ausdehnung des okklusalen Verankerungsflügels (14) angeordnet ist;

wobei der erste Satz von gingivalen und okklusalen Aussparungen (20) auf einer mesialen Seite der Klammer (10) angeordnet ist und der zweite Satz von gingivalen und okklusalen Aussparungen (22) auf einer distalen Seite der Klammer (10) angeordnet ist;

einen zweiten Satz von gegenüberliegenden konvexen Seitenwandteilen (42) innerhalb des Schlitzes (18) für den Drahtbogen, wobei der zweite Satz von konvexen Seitenwandteilen (42) im wesentlichen zwischen den gingivalen und okklusalen Aussparungen des zweiten Satzes von Aussparungen (22) angeordnet ist.

3. Seitliche kieferorthopädische Klammer nach Anspruch 1 oder 2, **dadurch gekennzeichnet, daß**

die dem Zahnfleisch zugewandte Aussparung einen abgeschrägten Abschnitt aufweist, der sich lippenförmig in Richtung des Schlitzes für den Drahtbogen erstreckt und daß die dem Gebiß zugewandte Aussparung einen abgeschrägten Abschnitt aufweist, der sich zungenförmig in Richtung des Schlitzes für den Drahtbogen erstreckt.

4. Seitliche kieferorthopädische Klammer nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, daß** die gingivale Aussparung darüber hinaus eine konkave Aussparung aufweist, die sich von einer gingivalen Kante des gingivalen Verankerungsflügels in Richtung des Schlitzes für den Drahtbogen erstreckt und daß die okklusale Aussparung darüber hinaus eine konkave Aussparung aufweist, die sich von einer okklusalen Kante des okklusalen Verankerungsflügels in Richtung des Schlitzes für den Drahtbogen erstreckt.

5. Seitliche kieferorthopädische Klammer nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, daß**

der gingivale Verankerungsflügel (12) weiterhin ein gingival ausgedehntes zentrales Beinteil (28) und gingival ausgedehnte mesiale und distale Verankerungsflügelspitzenabschnitte (30) aufweist;

der okklusale Verankerungsflügel (14) darüber hinaus ein okkusal ausgedehntes zentrales Beinteil (28) und okkusal ausgedehnte mesiale und distale Verankerungsflügelspitzenabschnitte (30) aufweist; und

wobei sich das gingival ausgedehnte zentrale Bein (28) über eine größere Distanz (F) von dem Schlitz (18) für den Drahtbogen erstreckt als jeder der sich gingival erstreckenden mesialen und distalen Verankerungsflügelspitzenabschnitte (30) und das okkusal ausgedehnte Zentralbein (28) sich über einen größeren Abstand (F) von dem Schlitz (18) für den Drahtbogen erstreckt als jeder der sich okkusal erstreckenden mesialen und distalen Verankerungsflügelspitzenabschnitte (30).

6. Seitliche kieferorthopädische Klammer nach Anspruch 2 oder einem der Ansprüche 3 bis 5, wenn diese von Anspruch 2 abhängen, **dadurch gekennzeichnet, daß** sie aufweist:

ein erstes konvexes Bodenteil (44) innerhalb des Schlitzes (18) für den Drahtbogen, das im wesentlichen zwischen dem ersten Satz von gingivalen und okklusalen Aussparungen (20) angeordnet ist; und

ein zweites konvexes Bodenteil (44) innerhalb des Schlitzes (18) für einen Drahtbogen, das im wesentlichen zwischen dem zweiten Satz von gingivalen und okklusalen Aussparungen



(22) angeordnet ist.

7. Seitliche kieferorthopädische Klammer nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, daß** die gingivalen Kanten des gingivalen Verankerungsflügels und die okklusale Kanten des okklusalen Verankerungsflügels eine elliptische Anordnung definieren.

#### Revendications

1. Bague orthodontique sur chant (10) comprenant :

des ailes d'ancrage gingivale et occlusale (12, 14) définissant entre elles une fente pour fil métallique en arc (18) s'ouvrant vers les lèvres, chacune des ailes d'ancrage gingivale et occlusale (12, 14) présentant une étendue mésiale/distale,

ladite bague (10) comprend également un premier ensemble d'encoques gingivale et occlusale (20), l'encoche gingivale étant disposée à l'intérieur de l'étendue mésiale/distale de ladite aile d'ancrage gingivale (12) et l'encoche occlusale étant disposée à l'intérieur de l'étendue mésiale/distale de ladite aile d'ancrage occlusale (14), **caractérisée par**

un premier ensemble de parties de parois latérales convexes opposées (42) à l'intérieur de ladite fente (18) pour fil métallique en arc, où ledit premier ensemble de parties de parois latérales convexes (42) est positionné sensiblement entre lesdites encoches gingivale et occlusale dudit premier ensemble d'encoques (20).

2. Bague orthodontique sur chant selon la revendication 1, comprenant en outre :

un second ensemble d'encoques gingivale et occlusale (22), l'encoche gingivale étant disposée à l'intérieur de l'étendue mésiale/distale de ladite aile d'ancrage gingivale (12) et l'encoche occlusale étant disposée à l'intérieur de l'étendue mésiale/distale de ladite aile d'ancrage occlusale (14),

-ledit premier ensemble d'encoques gingivale et occlusale (20) étant disposé sur un côté mésial de ladite bague (10) et ledit second ensemble d'encoques gingivale et occlusale (22) étant disposé sur un côté distal de ladite bague (10), un second ensemble de parties de parois latérales convexes opposées (42) à l'intérieur de ladite fente (18) pour fil métallique en arc, où ledit second ensemble de parties de parois latérales convexes (42) est disposé sensiblement entre lesdites encoches gingivale et oc-

clusale dudit second ensemble d'encoques (22).

3. Bague orthodontique sur chant selon la revendication 1 ou 2, dans laquelle ladite encoche gingivale comprend une partie inclinée s'étendant vers les lèvres en direction de la fente pour fil métallique en arc et ladite encoche occlusale comprend une partie inclinée s'étendant vers les lèvres vers la fente pour fil métallique en arc.

4. Bague orthodontique sur chant selon l'une quelconque des revendications précédentes, dans laquelle ladite encoche gingivale comprend en outre une encoche concave s'étendant depuis un bord gingival de ladite aile d'ancrage gingivale vers ladite fente pour fil métallique en arc et dans laquelle ladite encoche occlusale comprend en outre une encoche concave s'étendant depuis un bord occlusal de ladite aile d'ancrage occlusale vers ladite fente pour fil métallique en arc.

5. Bague orthodontique sur chant selon l'une quelconque des revendications précédentes, dans laquelle :

ladite aile d'ancrage gingivale (12) comprend en outre une partie de patte centrale s'étendant sur les gencives (28) et des parties d'extrémités d'ailes d'ancrage mésiales et distales (30) s'étendant sur les gencives, ladite aile d'ancrage occlusale (14) comprend en outre une partie de patte centrale (28) s'étendant sur la partie occlusale et des parties d'extrémités d'ailes d'ancrage mésiales et distales (30) s'étendant sur la partie occlusale, et

dans laquelle ladite patte centrale (28) s'étendant sur les gencives s'étend sur une plus grande distance (F) depuis ladite fente (18) pour fil métallique en arc que chacune des parties d'extrémités d'ailes d'ancrage mésiales et distales (30) s'étendant sur les gencives et ladite patte centrale (28) s'étendant sur la partie occlusale s'étend sur une plus grande distance (F) depuis ladite fente (18) pour fil métallique en arc que chacune desdites parties d'extrémités d'ailes d'ancrage mésiales et distales (30) s'étendant sur la partie occlusale.

6. Bague orthodontique sur chant selon la revendication 2 ou l'une quelconque des revendications 3 à 5 lorsqu'elles dépendent de la revendication 2, comprenant :

une première partie de fond convexe (44) à l'intérieur de ladite fente (18) pour fil métallique en arc, positionnée sensiblement entre ledit premier ensemble d'encoques gingivale et occlu-

sale (20), et  
une seconde partie de fond convexe (44) à l'intérieur de ladite fente (18) pour fil métallique en arc, positionnée sensiblement entre les encoches gingivale et occlusale dudit second ensemble (22).

5

7. Bague orthodontique sur chant selon l'une quelconque des revendications précédentes, dans lequel les bords gingivaux de ladite aile d'ancrage gingivale et les bords occlusaux de ladite aile d'ancrage occlusale définissent une configuration elliptique.

10

15

20

25

30

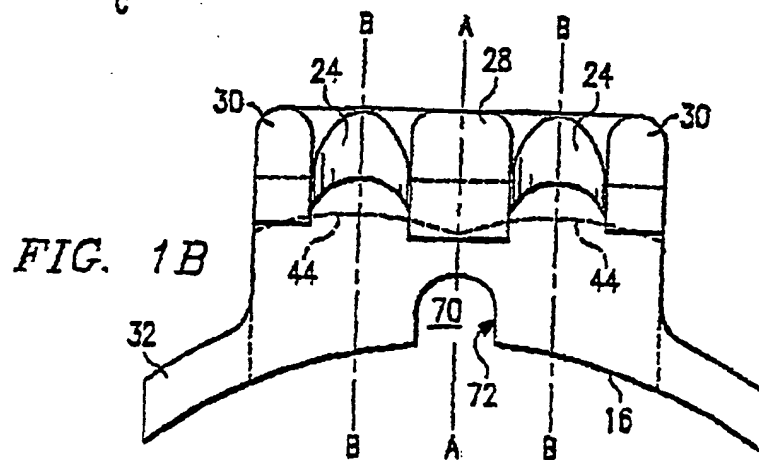
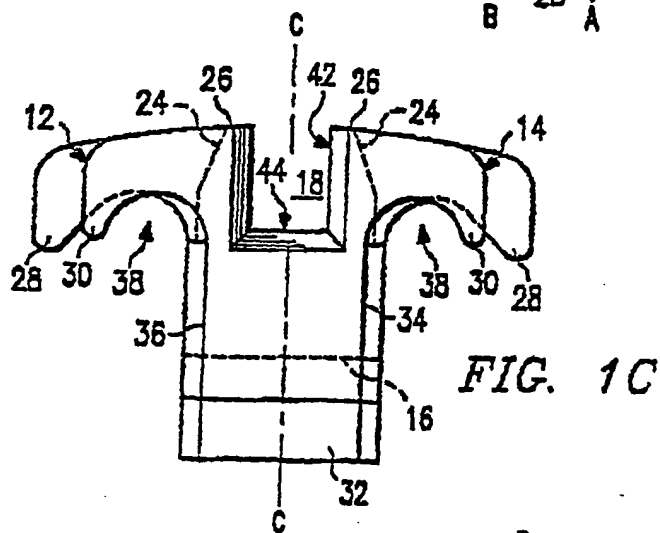
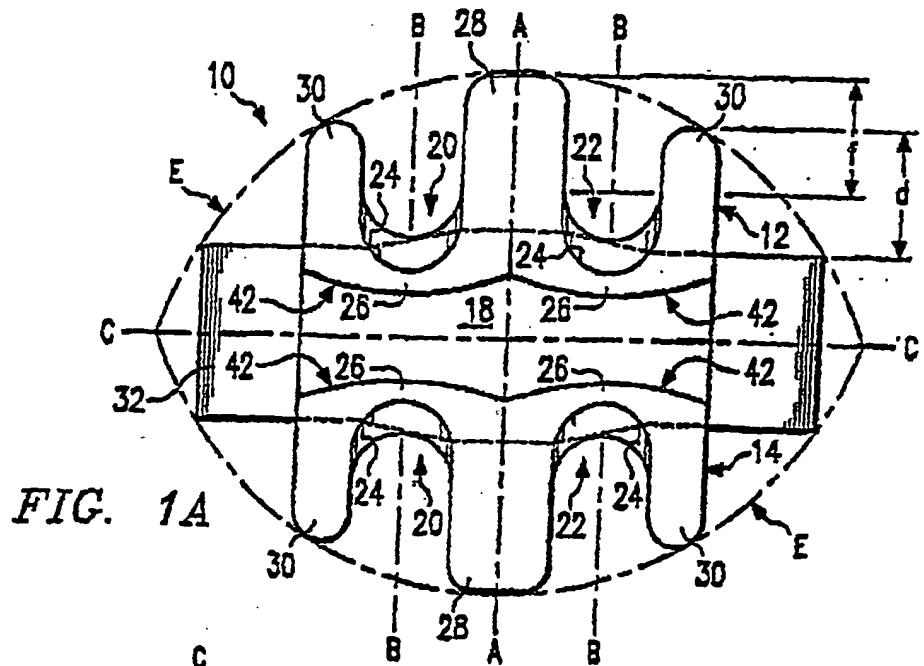
35

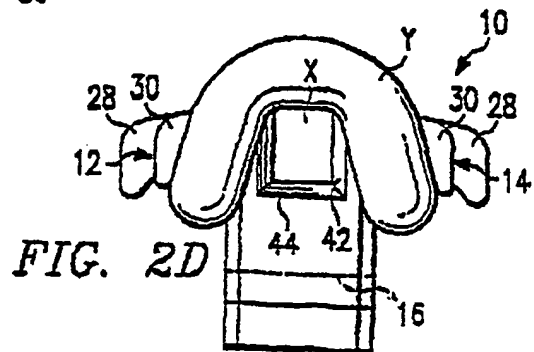
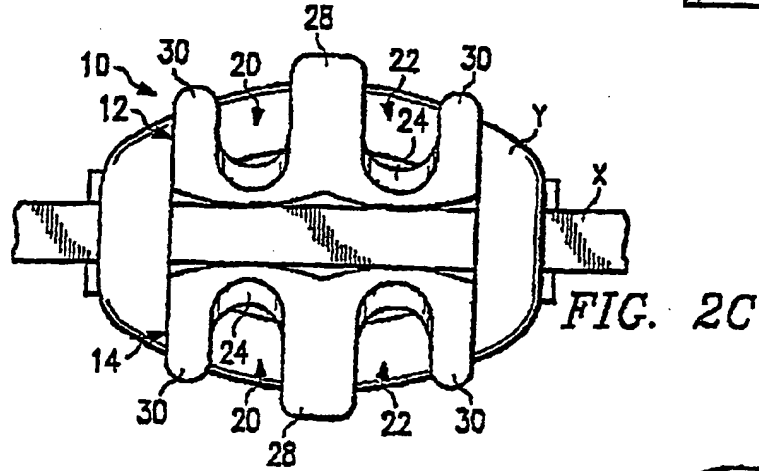
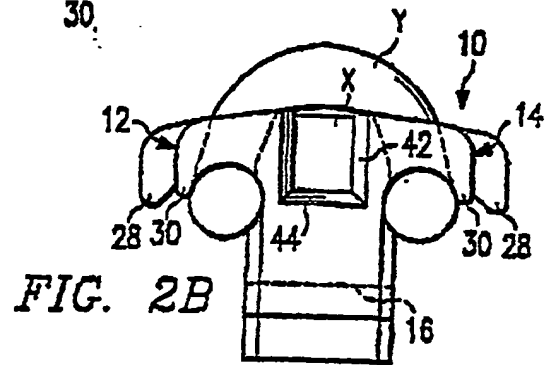
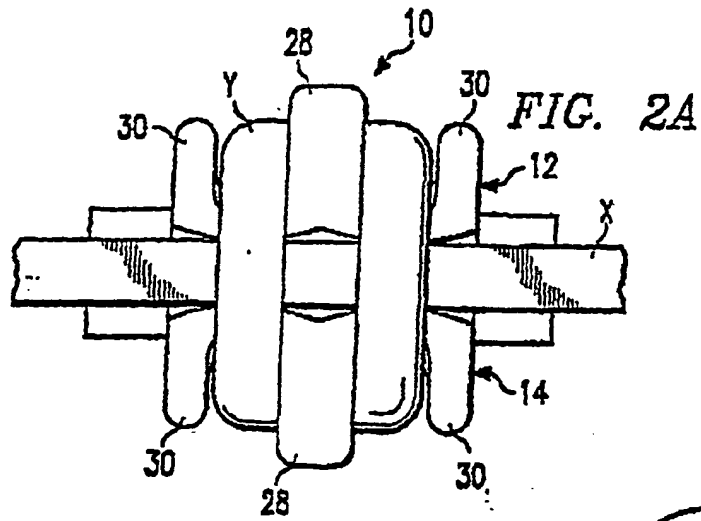
40

45

50

55





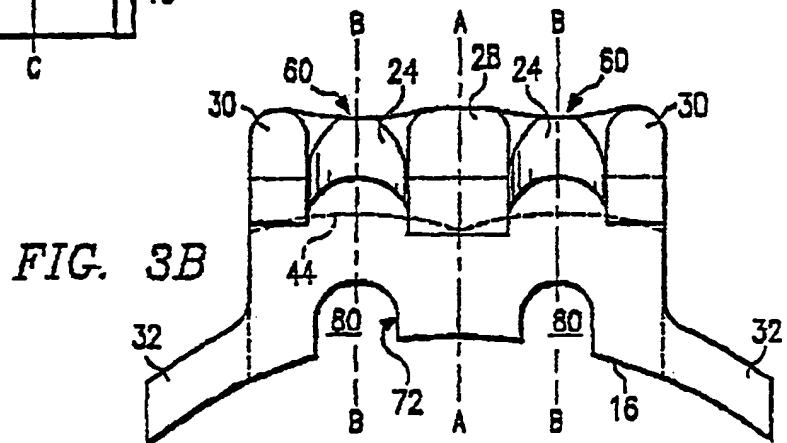
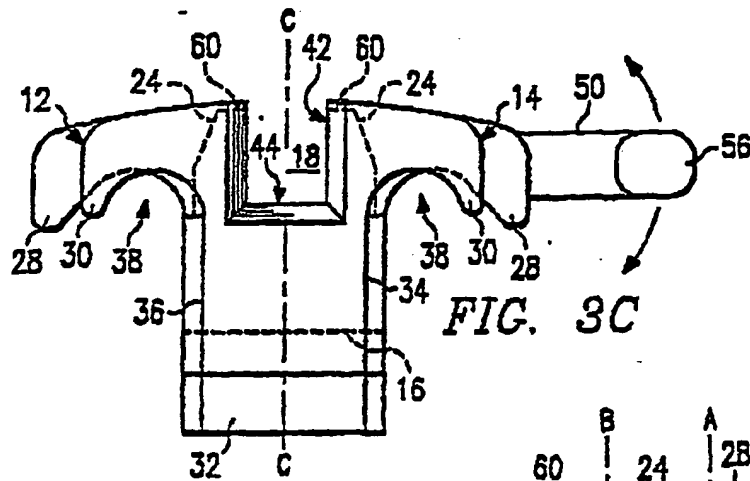
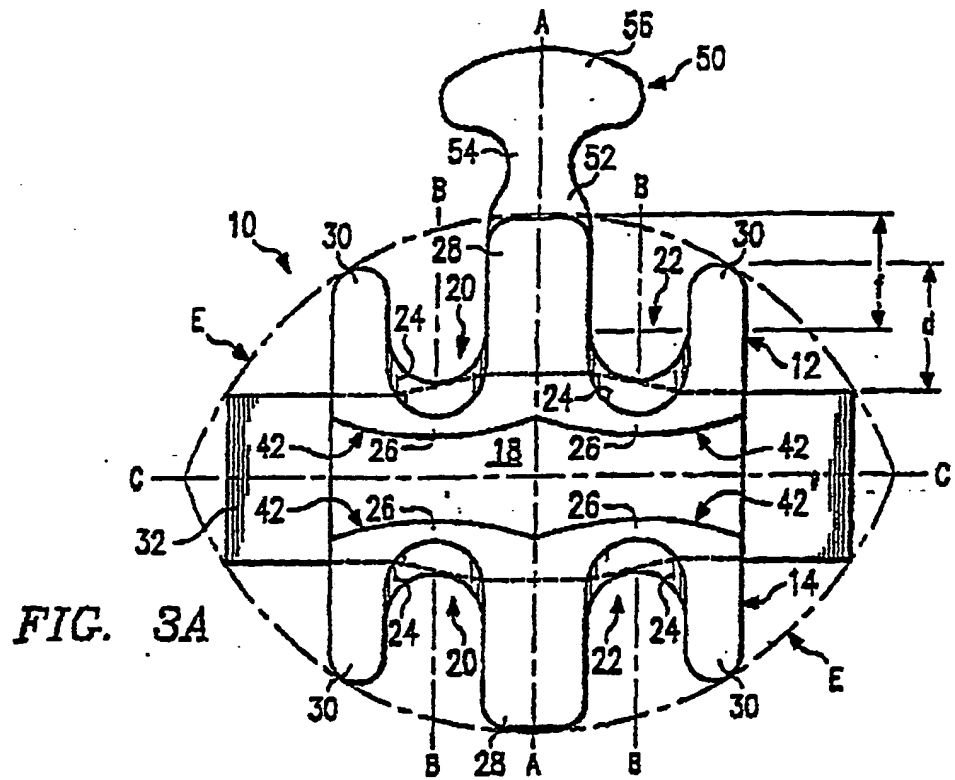


FIG. 4A

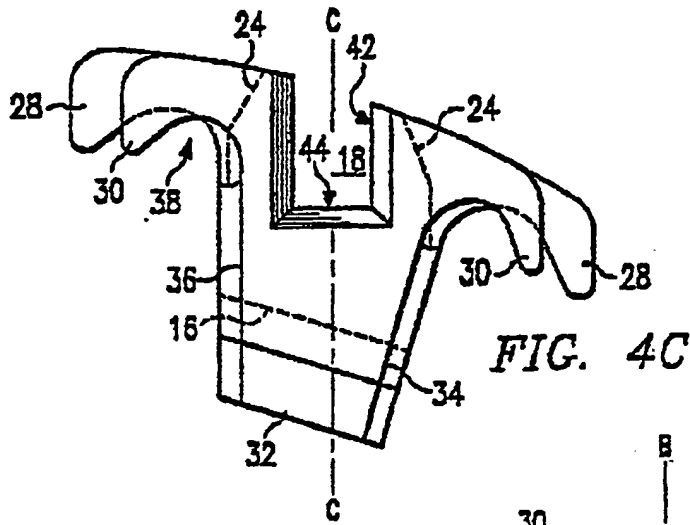
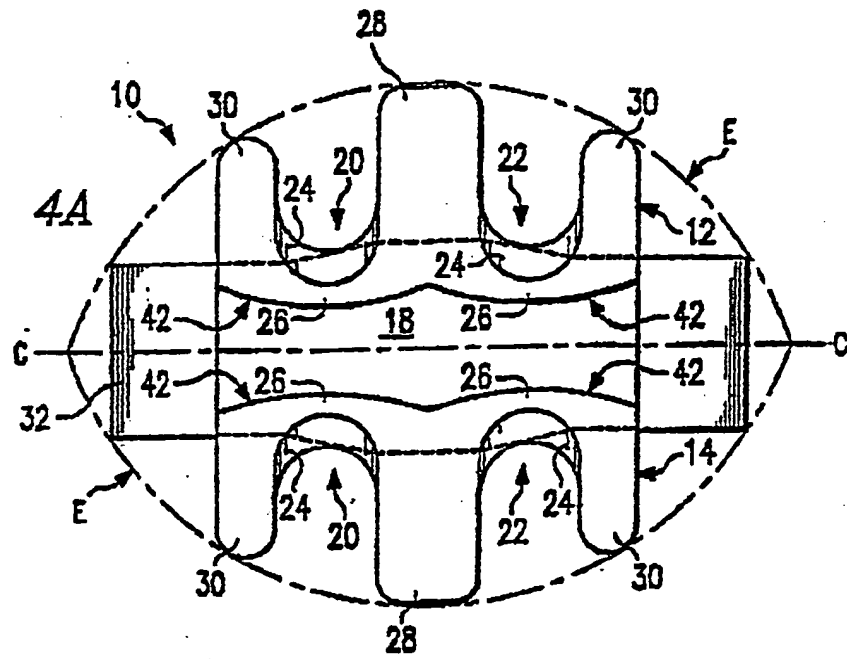


FIG. 4C

FIG. 4B

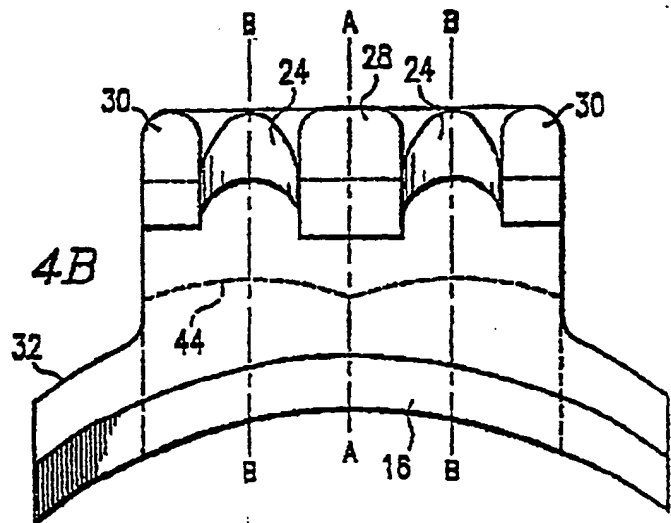


FIG. 5A

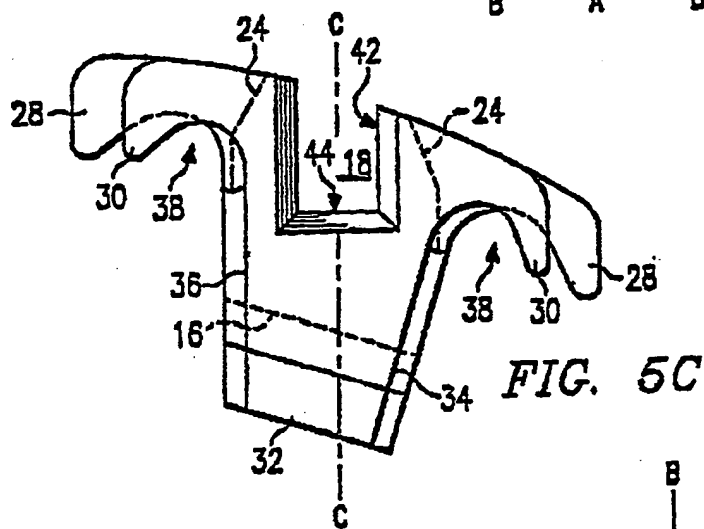
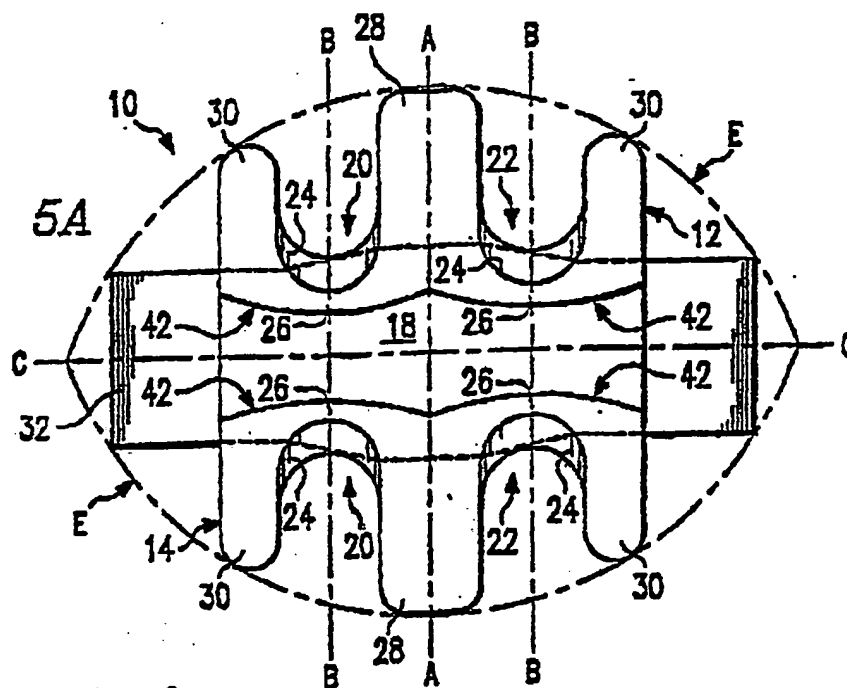


FIG. 5C

FIG. 5B

